

Drosos Koutsoubas*, Athanasios Koukouras*, Ioannis Karakassis & Costas Dounas****

CONTRIBUTION TO THE KNOWLEDGE OF GASTROPODA AND BIVALVIA (MOLLUSCA) OF CRETE ISLAND (S. AEGEAN SEA)***

KEY WORDS: Mollusca, Gastropoda, Bivalvia, Distribution, Aegean Sea.

Riassunto

L'esame del materiale raccolto, per la maggior parte dalla N/O «Philia», lungo le coste dell'isola di Creta (Mare Egeo), ha rivelato la presenza di 233 specie di molluschi (144 Gastropoda e 89 Bivalvia). 136 di queste sono segnalazioni nuove per la malacofauna di Creta, 7 per l'Egeo e 5 per il Mediterraneo Orientale. Per quanto concerne le specie del Mediterraneo Orientale; vengono fornite informazioni sul loro habitat e la loro distribuzione. Viene infine esposto un elenco ragionato della fauna a gasteropodi e bivalvi di Creta, comprendente 347 specie, con discussione della composizione sistematica e significato biogeografico di tale fauna.

Summary

The examination of benthic samples collected along the coasts of Crete Island (mainly by the R/V «Philia») revealed the presence of 233 mollusc species (144 Gastropoda and 89 Bivalvia). Of these species, 136 are new records for Crete, 7 species for the Aegean Sea and 5 for the Eastern Mediterranean. In reference to the Eastern Mediterranean species, information is given on their habitat and distribution. A check list of gastropods and bivalves of Crete, which includes 347 species, is also presented. The systematic composition and zoogeographical status of this fauna is discussed.

Introduction

The island of Crete is located in the southeast part of the Aegean Sea, on the natural limit with the Levant Sea, practically isolated from the neighbouring land masses by underwater trenches, deeper than 500-1000 m. The fauna of Crete Island, however, shows biogeographical affinity with that of the rest Aegean Sea, mainly because of surface currents and is also enriched with warm water species of Atlantic origin, such as other areas of the Eastern Mediterranean (EKMAN 1967; POR & DIMENTMAN, 1989). There is much interest in these phenomena but the existing information on Cretan fauna and its enrichment from other areas is sparse.

* Department of Zoology, University of Thessaloniki, 54006 Thessaloniki, Greece.

** Institute of Marine Biology of Crete, Box 2214, 71003 Iraklion, Greece.

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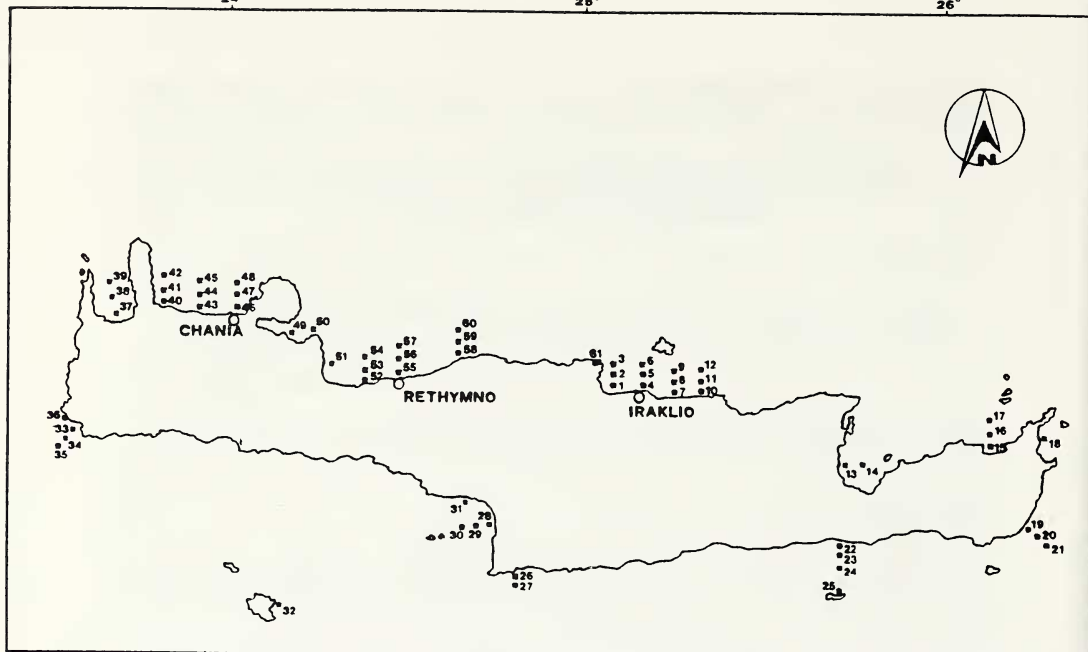


Fig. 1. Map of Crete Island indicating the sampling stations.

Stations	Date	Coordinates	Depth (m)	Type of substrate
3	7-5-1987	35° 24 20N - 25° 05 00E	130	clayey silt
4	7-5-1987	35° 21 10N - 25° 09 00E	20	fine sand with <i>Cymodocea nodosa</i>
5	7-5-1987	35° 21 90N - 25° 09 00E	70	silt
6	7-5-1987	35° 23 50N - 25° 09 00E	130	clayey silt
8	5-5-1987	35° 23 30N - 25° 13 00E	100	clayey silt
10	4-5-1987	35° 20 90N - 25° 18 00E	20	medium sand with <i>Caulerpa prolifera</i>
11	4-5-1987	35° 22 10N - 25° 18 00E	70	silt
12	4-5-1987	35° 23 60N - 25° 18 00E	130	clayey silt
13	8-5-1987	35° 09 80N - 25° 52 10E	40	sandy silt
14	8-5-1987	35° 10 80N - 25° 52 10E	100	silt
16	15-6-1987	35° 14 60N - 26° 09 10E	70	silt
17	16-6-1987	35° 17 00N - 26° 08 60E	160	clayey silt
18	16-6-1987	35° 14 00N - 26° 20 60E	190	silty clay
19	17-6-1987	35° 01 90N - 26° 15 52E	50	coralligenous
20	17-6-1987	35° 05 19N - 26° 15 90E	200	clayey silt
36	24-6-1987	35° 15 70N - 23° 35 00E	0-2	sand
40	1-3-1987	35° 34 10N - 23° 49 00E	40	medium sand with <i>Caulerpa prolifera</i>
41	1-3-1987	35° 36 60N - 23° 49 00E	100	silt
42	1-3-1987	35° 39 50N - 23° 49 00E	160	clayey silt
43	1-3-1987	35° 34 10N - 23° 55 00E	70	silt
44	1-3-1987	35° 37 30N - 23° 55 00E	130	clayey silt
47	23-2-1987	35° 36 50N - 24° 01 00E	100	silt
50	12-8-1987	35° 28 30N - 24° 12 40E	40	silty sand with <i>Caulerpa prolifera</i>
51	2-3-1987	35° 23 00N - 24° 19 60E	40	coarse sand with biogenic detritus
55	2-3-1987	35° 22 65N - 24° 28 20E	20	medium sand with <i>Caulerpa prolifera</i>
57	2-3-1987	35° 24 70N - 24° 28 20E	190	clayey silt
59	2-3-1987	35° 25 35N - 24° 34 30E	100	silt

Table I. Data of the sampling stations where species recorded for the first time from the Eastern Mediterranean or the Aegean Sea were collected.

FORBES (1844), the first who gave information on the mollusc fauna of Crete, reported 7 species (1 polyphacophore, 1 bivalve and 5 gastropods), whose actual presence was later confirmed by NORDSIECK (1977). Almost 40 years after FORBES, JEFFREYS (1883) recorded 75 species more (51 gastropods, 4 scaphopods and 20 bivalves) after the examination of material collected by Spratt at depths from 70 to 120 fathoms. Species reported from Crete by FORBES (1844) and JEFFREYS (1883) are included in the extended work of CARUS (1893).

Information on some species listed by JEFFREYS (1883) is given by PRUVOT-FOL (1954), WARÉN (1980), AARTSEN & CARROZZA (1983b) and AARTSEN (1985).

Additional records of new species for the mollusc fauna of Crete are provided by: STEINDACHNER (1891), 2 species; STURANY (1896), 24 species; PÉRÈS & PICARD (1958), 15 species; LEDOYER (1969), 32 species; SUMNER (1983), 14 species; NICOLAY & ANGIOY (1984), 1 species; NOFRONI (1986), 1 species; DIMITRAKIS (1987), 19 species; JANSSEN (1989), 31 species; TENEKIDIS (1989), 2 species. Other authors (NORDSIECK 1969, 1972, 1982; GRECCHI 1984), referring to the mollusc fauna of Crete, recorded the presence of some species that had been previously reported.

Combining the information provided by the above mentioned authors, a total of 223 species (1 polyplacophore, 142 gastropods, 9 scaphopods, 69 bivalves and 2 cephalopods) is known to form the mollusc fauna of Crete.

The main goal of this study was: (i) to give additional information on the little known gastropod and bivalve fauna of Crete Island, (ii) to present for the first time an updated check list of cretean gastropods and bivalves and (iii) to discuss their systematic composition and biogeographical status.

Material and methods

Benthic samples were collected from 61 sampling stations along the coasts of Crete Island at depths from 0 to 250 m. Samples were taken by the research vessel «Philia» of the Institute of Marine Biology of Crete with a Smith-McIntyre grab, in February-August 1987. Shallow waters sampling was carried out by SCUBA diving. Samples were preserved in dilute (5%) formalin with dissolved rose-bengal and are deposited in the Museum of the Department of Zoology, University of Thessaloniki.

The location of sampling stations is given in fig. 1. Relevant data of stations, where new species for the fauna of the Eastern Mediterranean and the Aegean Sea were recorded, are presented in Table I.

Results

The examination of the collected material (1230 live individuals and shells) revealed the presence of 233 species, 144 gastropods and 89 bivalves (Table II). 5 species (2.14%) are new records for the fauna of the eastern basin of the Mediterranean (eastern of 20°), 7 (3.00%) are new for the fauna of the Aegean Sea and 136 (58.37%), 80 gastropods and 56 bivalves, are reported for the first time for Crete.

Table II. Gastropod and bivalve species known from the Crete Island (examined material and literature). A = authors of this paper; L1-L13 = literature. (L1: Forbes 1844; L2: Jeffreys 1883; L3: Steindachner 1891; L4: Jeffreys in Carus 1893; L5: Sturany 1896; L6: Pérès & Picard 1958; L7: Ledoyer 1969; L8: Sumner 1983; L9: Nicolay & Angioy 1984; L10: Nofroni 1988; L11: Dimitrakis 1987; L12: Janssen 1989; L13: Tenekidis 1989).

GASTROPODA

<i>Acis ascaris</i> (TURTON, 1819)	L4	<i>Columbella rustica</i> (LINNAEUS, 1758)	A, L7
<i>Acis attenuans</i> JEFFREYS, 1883	A, L2	<i>Comarmondia gracilis</i> (MONTAGU, 1803)	A
<i>Acis minor</i> (BROWN, 1827)	A	<i>Conus mediterraneus</i> HWASS in BRUGUIERE, 1792	A, L7
<i>Acmaea virginea</i> (MULLER, 1776)	A, L1	<i>Copulabyssia corrugata</i> (JEFFREYS, 1883)	L12
<i>Acteon tomatis</i> (LINNAEUS, 1758)	A	<i>Corallophila squamosa</i> (BIVONA, 1838)	A, L1
<i>Alvania beani</i> (HANLEY in THORPE, 1844)	A, L4	<i>Crassopleura incrassata</i> (DUJARDIN, 1837)	A
<i>Alvania cancellata</i> (DA COSTA, 1778)	A, L7	<i>Crenilabium exile</i> (JEFFREYS, 1870 ex FORBES ms.)	A, L12
<i>Alvania cimex</i> (LINNAEUS, 1758)	L4	<i>Creseis acicula</i> RANG, 1828	A
<i>Alvania cimicoides</i> (FORBES, 1844)	A, L4	<i>Creseis virgula</i> RANG, 1828	A
<i>Alvania discors</i> (ALLAN, 1818)	A, L7	<i>Cyclope neritea</i> (LINNAEUS, 1758)	L11
<i>Alvania lineata</i> RISSO, 1828	L4	<i>Cylichna parvula</i> JEFFREYS, 1883	L2
<i>Alvania paupercula</i> (JEFFREYS, 1867)	A	<i>Cylichnina umbilicata</i> (MONTAGU, 1803)	A
<i>Alvania punctura</i> (MONTAGU, 1803)	L4	<i>Cylichnium africanum</i> LOCARD, 1897	L12
<i>Alvania subcrenulata</i> (B. D. D., 1884)	L7	<i>Diaphana cretica</i> (FORBES, 1844)	L1
<i>Alvania subsoluta</i> (ARADAS, 1847)	L4	<i>Diaphana lactea</i> (JEFFREYS, 1877)	L12
<i>Alvania tessellata</i> WEINKAUFF, 1868 ex SCHWARTZ ms	L7	<i>Diodora gibberula</i> (LAMARCK, 1822)	A
<i>Alvania testae</i> (ARADAS & MAGGIORE, 1843)	A, L4	<i>Diodora graeca</i> (LINNAEUS, 1758)	A
<i>Amphissa acutocostata</i> (PHILIPPI, 1844)	L12	<i>Discotectonica discus</i> (PHILIPPI, 1844)	A
<i>Anatoma crispata</i> FLEMING, 1828	A, L4	<i>Emarginula adriatica</i> COSTA O.G., 1829	A
<i>Aplysia punctata</i> (CUVIER, 1803)	A, L7	<i>Emarginula rosea</i> BELL, 1824	L4
<i>Aporrhais pespelecani</i> (LINNAEUS, 1758)	A	<i>Emarginula sicula</i> GRAY, 1825	L4
<i>Aporrhais serresianus</i> (MICHAUD, 1828)	L4	<i>Epitonium aculeatum</i> (ALLAN, 1818)	A
<i>Ascobolla fragilis</i> (JEFFREYS, 1856)	A	<i>Erato voluta</i> (MONTAGU, 1803)	A
<i>Atlanta inflata</i> SOULEYET, 1852	A	<i>Eulimella acicula</i> (PHILIPPI, 1836)	A, L4
<i>Atlanta peroni</i> LESUEUR, 1817	A	<i>Eulimella scillae</i> (SCACCHI, 1835)	L5
<i>Atyis jeffreysi</i> (WEINKAUFF, 1866)	A	<i>Eulimella ventricosa</i> (FORBES, 1844)	L5
<i>Barleeia unifasciata</i> (MONTAGU, 1803)	L7	<i>Euparthenia humboldti</i> (RISSO, 1826)	L4
<i>Bela merkhorsti</i> VAN AARTSEN, 1988	A	<i>Euspira nitida</i> (DONOVAN, 1804)	A
<i>Bela nebula</i> (MONTAGU, 1803)	A	<i>Fasciolaria ligniaria</i> (LINNAEUS, 1758)	A, L7
<i>Benthomangelia macra</i> (WATSON, 1881)	L5	<i>Filorida desmarestia</i> LESUEUR, 1817	L2
<i>Benthonella tenella</i> (JEFFREYS, 1869)	L12	<i>Fissurella nubecula</i> (LINNAEUS, 1758)	L11
<i>Bittium lacteum lacteum</i> (PHILIPPI, 1836)	A	<i>Folinella excavata</i> (PHILIPPI, 1836)	A, L5
<i>Bittium reticulatum</i> (DA COSTA, 1778)	A, L7	<i>Fusinus pulchellus</i> (PHILIPPI, 1844)	A, L7
<i>Bolinus brandaris</i> (LINNAEUS, 1758)	A	<i>Fusinus rostratus</i> (OLIVI, 1792)	A, L3
<i>Bolma rugosa</i> (LINNAEUS, 1767)	A, L4	<i>Fusinus syracusanus</i> (LINNAEUS, 1758)	L11
<i>Buccinulum comeum</i> (LINNAEUS, 1758)	L7	<i>Gibberula miliaria</i> (LINNAEUS, 1758)	A
<i>Bulla striata</i> BRUGUIERE, 1789	A, L11	<i>Gibberula philippii</i> (MONTEROSATO, 1878)	A
<i>Bulbus globosus</i> (JEFFREYS, 1865)	L12	<i>Gibbula adansonii</i> (PAYRAUDEAU, 1826)	L4
<i>Calciostoma conulus</i> (LINNAEUS, 1758)	A	<i>Gibbula ardens</i> (VON SALIS, 1793)	A, L7
<i>Calciostoma granulatum</i> (VON BORN, 1778)	A	<i>Gibbula guttatum</i> (GMELIN, 1791)	L4
<i>Calciostoma laugieri</i> (PAYRAUDEAU, 1826)	L7	<i>Gibbula gattadauri</i> (PHILIPPI, 1836)	L4
<i>Calyptrea chinensis</i> (LINNAEUS, 1758)	L4	<i>Gibbula magus</i> (LINNAEUS, 1758)	L4
<i>Capulus ungericus</i> (LINNAEUS, 1758)	A	<i>Gibbula spratti</i> (FORBES, 1844)	A
<i>Cerithium rupestre</i> RISSO, 1828	A, L8	<i>Gibbula varia</i> (LINNAEUS, 1758)	A
<i>Cerithium vulgatum</i> BRUGUIERE, 1792	A, L4	<i>Granulina clandestina</i> (BROCCHI, 1814)	A, L7
<i>Charonia lampas</i> (LINNAEUS, 1758)	L6	<i>Granulina occulta</i> (MONTEROSATO, 1869)	A, L5
<i>Charonia tritonis variegata</i> (LAMARCK, 1816)	A, L4	<i>Gymnobela subaraneosa</i> (DAUTZENBERG & FISCHER, 1896)	L12
<i>Chauvetia affinis</i> (MONTEROSATO, 1889)	A	<i>Haedropleura septangularis</i> (MONTAGU, 1803)	A
<i>Chrysalida brevicula</i> (JEFFREYS, 1883)	L2	<i>Haliotis tuberculata lamellosa</i> LAMARCK, 1822	A
<i>Chrysalida jeffreysiana</i> (MONTEROSATO, 1884)	A	<i>Haminoea hydatis</i> (LINNAEUS, 1758)	A
<i>Chrysalida obtusa</i> (BROWN, 1827)	A	<i>Hexaplex trunculus</i> (LINNAEUS, 1758)	A, L7
<i>Cima minima</i> (JEFFREYS, 1858)	L2	<i>Homalopoma sanguineum</i> (LINNAEUS, 1758)	A, L4
<i>Cirsotrema cochlea</i> (SOWERBY G.B. II, 1844)	L11	<i>Hyala vitrea</i> (MONTAGU, 1803)	A
<i>Ciancullus corallinus</i> (GMELIN, 1791)	A, L7	<i>Janthina nitens</i> MENKE, 1828	L13
<i>Ciancullus cruciatus</i> (LINNAEUS, 1758)	L4	<i>Japonacteon pusillus</i> (MacGILLIVRAY, 1843)	A, L12
<i>Clathromangelia quadrillum</i> (DUJARDIN, 1837)	A, L5	<i>Jujubinus exasperatus</i> (PENNANT, 1777)	A, L7
<i>Clelandella militaris</i> (BROCCHI, 1814)	A, L5	<i>Jujubinus montagui</i> (WOOD W., 1828)	L4
<i>Cocculina mamilla</i> DI GERONIMO, 1974	L12	<i>Jujubinus striatus</i> (LINNAEUS, 1758)	A, L4

<i>Lamellaria perspicua</i> (LINNAEUS, 1758)	A	<i>Pyramidella minuscula</i> MONTEROSATO, 1880	L4
<i>Limacina inflata</i> (D'ORBIGNY, 1836)	A,L4	<i>Raphitoma concinna</i> (SCACCHI, 1836)	A
<i>Limacina trochiformis</i> (D'ORBIGNY, 1836)	A,L4	<i>Raphitoma linearis</i> (MONTAGU, 1803)	A
<i>Lissospira conspicua</i> (MONTEROSATO, 1880)	L12	<i>Raphitoma pseudohystrix</i> (SYKES, 1908)	A
<i>Littorina neritoides</i> (LINNAEUS, 1758)	A,L11	<i>Retusa mammilata</i> (PHILIPPI, 1836)	L1
<i>Lusitanops cf. sigmoidea</i> BOUCHET & WARREN, 1980	L12	<i>Retusa semisulcata</i> (PHILIPPI, 1836)	A
<i>Mangelia paciniana</i> (CALCARA, 1839)	A	<i>Retusa truncatula</i> (BRUGUIERE, 1792)	A,L7
<i>Mangelia scabrida</i> MONTEROSATO, 1890	A	<i>Ringicula auriculata</i> (MENIARD de la GROYE, 1811)	A,L7
<i>Mangelia smithi</i> (FORBES, 1840)	A	<i>Ringicula conformis</i> MONTEROSATO, 1877	A
<i>Mangiliella bertrandi</i> (PAYRAUDEAU, 1826)	A	<i>Rissoa guerinii</i> (RECLUZ, 1843)	L4
<i>Mangonia zetlandica</i> (MONTAGU, 1815)	A,L4	<i>Rissoa monodonta</i> PHILIPPI, 1836	A
<i>Melanella spiridioni</i> (DAUTZENBERG & FISCHER, 1896)	L12	<i>Rissoa similis</i> SCACCHI, 1836	L7
<i>Melanella stalioti</i> (BRUSINA, 1869)	A	<i>Rissoa variabilis</i> (VON MUHLFELDT, 1824)	L4
<i>Microdrillia loprestiana</i> (CALCARA, 1841)	A,L5	<i>Rissoa ventricosa</i> DESMAREST, 1814	A
<i>Mitra comicula</i> (LINNAEUS, 1758)	A,L11	<i>Rissoina bruguiereri</i> (PAYRAUDEAU, 1826)	L4
<i>Mitrella scripta</i> (LINNAEUS, 1758)	L7	<i>Roxania utriculus</i> (BROCCHI, 1814)	A
<i>Mitrolumna olivoidea</i> (CANTRAINED, 1835)	A	<i>Scaphander punctostriatus</i> (MIGHELS & ADAMS, 1841)	L12
<i>Monodonta turbinata</i> (VON BORN, 1778)	A,L11	<i>Scissurella costata</i> D'ORBIGNY, 1824	L5
<i>Monophorus perversus</i> (LINNAEUS, 1758)	A,L4	<i>Seila trilineata</i> (PHILIPPI, 1836)	A
<i>Muricopsis cristata</i> (BROCCHI, 1814)	L7	<i>Serpulorbis arenaria</i> (LINNAEUS, 1758)	L6
<i>Nassarius comiculatus</i> (OLIVI, 1792)	A,L7	<i>Sinezona cingulata</i> (COSTA O.G., 1861)	L13
<i>Nassarius gibbosulus</i> (LINNAEUS, 1758)	A,L10	<i>Smargdia viridis</i> (LINNAEUS, 1758)	A,L7
<i>Nassarius incrassatus</i> (STROM, 1768)	A,L11	<i>Teretia teres</i> (REEVE, 1844)	A
<i>Nassarius mutabilis</i> (LINNAEUS, 1758)	A,L6	<i>Tjaemoeia exquisita</i> (JEFFREYS, 1883)	L2
<i>Natica filiosa</i> PHILIPPI, 1845	A,L4	<i>Tonna galea</i> (LINNAEUS, 1758)	L11
<i>Natica hebraea</i> (MARTYN, 1784)	A	<i>Tragula fenestrata</i> (FORBES in JEFFREYS, 1848)	A,L4
<i>Natica stercusmuscarum</i> (GMELIN, 1791)	A	<i>Tricolia pullus</i> (LINNAEUS, 1758)	A,L7
<i>Neverita josephina</i> RISSO, 1826	A	<i>Tricolia speciosa</i> (VON MUHLFELDT, 1824)	A
<i>Obtusella intersecta</i> (WOOD S.W., 1857)	A,L4	<i>Tricolia tenuis</i> (MICHAUD, 1829)	A
<i>Obtusella macilentata</i> (MONTEROSATO, 1880)	L2	<i>Trophon muricatus</i> (MONTAGU, 1803)	A
<i>Ocenebra eninaceus</i> (LINNAEUS, 1758)	L11	<i>Turbonilla pusilla</i> (PHILIPPI, 1844)	A
<i>Ocenebrina aciculata</i> (LAMARCK, 1822)	A	<i>Turbonilla rufa</i> (PHILIPPI, 1836)	A
<i>Ocenebrina edwardsii</i> (PAYRAUDEAU, 1826)	A	<i>Turbonilla striatula</i> (LINNAEUS, 1758)	A
<i>Odostomia clavulus</i> (LOVEN, 1846)	A,L4	<i>Turritella communis</i> RISSO, 1826	A,L8
<i>Odostomia conoidea</i> (BROCCHI, 1814)	A	<i>Turritella turbona</i> MONTEROSATO, 1877	A
<i>Odostomia conspicua</i> ALDER, 1850	A	<i>Typhinellus sowerbyi</i> (BRODERIP, 1833)	A
<i>Odostomia scalaris</i> MacGILLIVRAY, 1843	A,L7	<i>Vitreolina antiflexa</i> MONTEROSATO, 1884	A
<i>Odostomia unidentata</i> (MONTAGU, 1803)	L4	<i>Vitreolina perminima</i> (JEFFREYS, 1883)	L2
<i>Omalogyra atomus</i> (PHILIPPI, 1841)	A	<i>Vermetus comeus</i> FORBES, 1844	L1
<i>Ondina diaphana</i> (JEFFREYS, 1848)	L4	<i>Vermetus triquetrus</i> BIVONA ANT., 1832	L6
<i>Patella caerulea</i> LINNAEUS, 1758	A,L6	<i>Vexillum ebenus</i> (LAMARCK, 1811)	A,L8
<i>Patella rustica</i> LINNAEUS, 1758	A,L6	<i>Vexillum tricolor</i> (GMELIN, 1791)	A,L7
<i>Patella ulyssiponensis</i> GMELIN, 1791	L6	<i>Volvarina mitrella</i> (RISSO, 1826)	A
<i>Payraudeautia intricata</i> (DONOVAN, 1804)	A	<i>Volvulella acuminata</i> (BRUGUIERE, 1789)	A
<i>Peracle reticulata</i> (D'ORBIGNY, 1836)	L4	<i>Weinkauffia turgidula</i> (FORBES, 1844)	A
<i>Phalium granulatatum</i> (VON BORN, 1778)	L2	<i>Xanthodaphne dalmasi</i> (DAUTZENBERG & FISCHER, 1897)	L12
<i>Philine catena</i> (MONTAGU, 1803)	A,L7		
<i>Pisania striata</i> (GMELIN, 1791)	A		
<i>Pleurotomella eurybrocha</i> (DAUTZENBERG & FISCHER, 1896)	L12	BIVALVIA	
<i>Pollia dorbignyi</i> (PAYRAUDEAU, 1826)	A,L8		
<i>Pollia scacchiana</i> (PHILIPPI, 1844)	A,L9	<i>Abra alba</i> (WOOD W., 1802)	A,L4
<i>Punctiscala cengottana</i> (STURANY, 1896)	L5	<i>Abra longicallus</i> (SCACCHI, 1834)	A,L4
<i>Pusillina diversa</i> (NORDSIECK, 1972)	L4	<i>Abra nitida</i> (MULLER O.F., 1789)	A
<i>Pusillina inconspicua</i> (ALDER, 1844)	L4	<i>Abra prismatica</i> (MONTAGU, 1808)	A,L4
<i>Pusillina lineolata</i> (MICHAUD, 1832)	A	<i>Acanthocardia aculeata</i> (LINNAEUS, 1758)	L6
<i>Pusillina marginata</i> (MICHAUD, 1832)	L7	<i>Acanthocardia echinata</i> (LINNAEUS, 1758)	A,L4
<i>Pusillina parva</i> (DA COSTA, 1778)	A	<i>Acanthocardia paucicostata</i> (SOWERBY G.B.II, 1841)	A
<i>Pusillina philippi</i> (ARADAS & MAGGIORE, 1844)	L7	<i>Acanthocardia spinosa</i> (SOLANDER, 1786)	A
<i>Pusillina radiata</i> (PHILIPPI, 1836)	L7	<i>Acanthocardia tuberculata</i> (LINNAEUS, 1758)	A
<i>Putzeya wiseri</i> (CALCARA, 1842)	L5	<i>Aequipecten opercularis</i> (LINNAEUS, 1758)	A,L5

<i>Anodontia fragilis</i> (PHILIPPI, 1836)	A,L4	<i>Modiolus adriaticus</i> (LAMARCK, 1819)	A
<i>Anomia ephippium</i> LINNAEUS, 1758	A,L5	<i>Musculus costulatus</i> (RISSO, 1826)	A
<i>Arca noae</i> LINNAEUS, 1758	A	<i>Musculus discors</i> (LINNAEUS, 1767)	A
<i>Atrina pectinata</i> (LINNAEUS, 1767)	L6	<i>Myrtea spinifera</i> (MONTAGU, 1803)	A,L6
<i>Axinulus croulinensis</i> (JEFFREYS, 1847)	A,L4	<i>Mysella bidentata</i> (MONTAGU, 1803)	L4
<i>Barbatia barbatia</i> (LINNAEUS, 1758)	L11	<i>Mytilaster minimus</i> (POLI, 1795)	A
<i>Barbatia clathrata</i> (DEFRANCE, 1816)	A	<i>Nucula hanleyi</i> WINCKWORTH, 1931	A
<i>Barbatia scabra</i> (POLI, 1795)	L5	<i>Nucula nitidosa</i> WINCKWORTH, 1930	A
<i>Bathyarca grenophia</i> (RISSO, 1826)	A,L4	<i>Nucula nucleus</i> (LINNAEUS, 1758)	A
<i>Bathyarca philippiana</i> (NYST, 1848)	L5	<i>Nucula sulcata</i> BRONN, 1831	A,L12
<i>Cardiomya costellata</i> (DESHAYES, 1835)	A,L12	<i>Nuculana commutata</i> (PHILIPPI, 1844)	A
<i>Cardita calyculata</i> (LINNAEUS, 1758)	L8	<i>Nuculana pella</i> (LINNAEUS, 1767)	A
<i>Chama gryphoides</i> LINNAEUS, 1758	L8	<i>Nuculoma aegeensis</i> FORBES, 1844	A,L1
<i>Chamelea gallina</i> (LINNAEUS, 1758)	A,L11	<i>Nuculoma corbuloides</i> SEGUENZA G., 1877	L12
<i>Chlamys flexuosa</i> (POLI, 1795)	A	<i>Pandora inaequalis</i> (LINNAEUS, 1758)	A,L4
<i>Chlamys glabra</i> (LINNAEUS, 1758)	A	<i>Paphia aurea</i> (GMELIN, 1791)	L4
<i>Clausinella fasciata</i> (DA COSTA, 1778)	A,L4	<i>Parvicardium exiguum</i> (GMELIN, 1791)	A
<i>Corbula gibba</i> (OLIVI, 1792)	A	<i>Parvicardium minimum</i> (PHILIPPI, 1836)	A,L4
<i>Ctena decussata</i> (COSTA O.G., 1829)	A	<i>Phaxas adriaticus</i> (COEN, 1933)	A
<i>Cuspidaria abbreviata</i> (FORBES, 1843)	A	<i>Pinna nobilis</i> LINNAEUS, 1758	L11
<i>Cuspidaria cuspidata</i> (OLIVI, 1792)	A,L4	<i>Pitar nudis</i> (POLI, 1795)	A,L4
<i>Cuspidaria obesa</i> (LOVEN, 1846)	L12	<i>Plagiocardium papillosum</i> (POLI, 1795)	A,L8
<i>Cuspidaria rostrata</i> (SPENGLER, 1793)	A,L12	<i>Pododesmus patelliformis</i> (LINNAEUS, 1761)	L8
<i>Delectopecten vitreus</i> (GMELIN, 1791)	L5	<i>Poromya granulata</i> (NYST & WESTENDORP, 1839)	L4
<i>Digitaria digitaria</i> (LINNAEUS, 1758)	A	<i>Poromya neaeroides</i> SEGUENZA G., 1877	L12
<i>Donax semistriatus</i> POLI, 1795	A	<i>Propeamussium fenestratum</i> (FORBES, 1844)	A
<i>Donax trunculus</i> LINNAEUS, 1758	A,L11	<i>Psammobia costulata</i> TURTON, 1822	A
<i>Dosinia lupinus</i> (LINNAEUS, 1758)	A	<i>Pseudamussium clavatum</i> (POLI, 1795)	L6
<i>Ensis minor</i> (CHENU, 1843)	L11	<i>Pseudamussium septemradiatum</i> (MULLER, 1776)	A
<i>Gastrochaena dubia</i> (PENNANT, 1777)	A	<i>Solemya togata</i> (POLI, 1795)	A
<i>Glans aculeata</i> (POLI, 1795)	L5	<i>Sphenia binghami</i> TURTON, 1822	A
<i>Glans trapezia</i> (LINNAEUS, 1767)	A	<i>Spisula subtruncata</i> (DA COSTA, 1778)	A,L4
<i>Globivenus effosa</i> (PHILIPPI ex BIVONA ms., 1836)	A,L6	<i>Spondylus gaederopus</i> LINNAEUS, 1758	L11
<i>Glossus humanus</i> (LINNAEUS, 1758)	A,L4	<i>Spondylus gussonii</i> COSTA O.G., 1829	L3
<i>Glycymeris glycymeris</i> (LINNAEUS, 1758)	A	<i>Striarca lactea</i> (LINNAEUS, 1758)	A,L8
<i>Glycymeris insubrica</i> (BROCCHI, 1814)	A,L11	<i>Tellima ferruginosa</i> (MONTAGU, 1808)	A
<i>Gonilia calliglypta</i> (DALL, 1903)	A	<i>Tellina balaustina</i> LINNAEUS, 1758	A
<i>Goodallia triangularis</i> (MONTAGU, 1803)	L5	<i>Tellina compressa</i> BROCCHI, 1814	A
<i>Gouldia minima</i> (MONTAGU, 1803)	A,L4	<i>Tellina donacina</i> LINNAEUS, 1758	A
<i>Hiatella arctica</i> (LINNAEUS, 1767)	A	<i>Tellina fabula</i> GMELIN, 1791	A
<i>Hyalopecten similis</i> (LASKEY, 1811)	A,L5	<i>Tellina planata</i> LINNAEUS, 1758	A
<i>Idasola argentea</i> (JEFFREYS, 1881)	L12	<i>Tellina pulchella</i> LAMARCK, 1818	A
<i>Kelliella abyssicola</i> (FORBES, 1844)	L5	<i>Tellina serrata</i> BROCCHI, 1814	A
<i>Laevicardium oblongum</i> (GMELIN, 1791)	A	<i>Thracia papyracea</i> (POLI, 1791)	A
<i>Laevicordia gemma</i> (VERILL, 1880)	L12	<i>Thyasira flexuosa</i> (MONTAGU, 1803)	A
<i>Lentidium mediterraneum</i> (COSTA O.G., 1839)	A	<i>Thyasira granulosa</i> (MONTEROSATO, 1874 ex JEFFREYS ms)	A
<i>Leptaxinus ferruginosus</i> (FORBES, 1844)	A	<i>Timoclea ovata</i> (PENNANT, 1777)	A,L4
<i>Lima lima</i> (LINNAEUS, 1758)	A,L11	<i>Turtonia minuta</i> (FABRICIUS O., 1780)	A
<i>Limatula gwyni</i> (SYKES, 1903)	L12	<i>Venericardia antiquata</i> (LINNAEUS, 1758)	A
<i>Limatula subauniculata</i> (MONTAGU, 1808)	A,L5	<i>Venerupis senegalensis</i> (GMELIN, 1791)	L8
<i>Limatula subovata</i> (JEFFREYS, 1876)	A	<i>Venus verrucosa</i> LINNAEUS, 1758	L8
<i>Limea crassa</i> (FORBES, 1844)	L5	<i>Xylophaga dorsalis</i> (TURTON, 1819)	L8
<i>Lithophaga lithophaga</i> (LINNAEUS, 1758)	L8	<i>Xylophaga praestans</i> SMITH E.A., 1885	L12
<i>Loripes lacteus</i> (LINNAEUS, 1758)	A	<i>Yoldia micrometrica</i> (SEGUENZA G., 1877)	L12
<i>Lucinella divanicata</i> (LINNAEUS, 1758)	L4	<i>Yoldiella frigida</i> (TORELL, 1859)	L12
<i>Lyonsia norwegica</i> (GMELIN, 1791)	A		
<i>Mactra stultorum</i> (LINNAEUS, 1758)	A		
<i>Malletia obtusa</i> (SARS G.O., 1872 ex SARS M. ms.)	L12		
<i>Modiolarca subpicta</i> (CANTRAINÉ, 1835)	A		
<i>Modiolula phaseolina</i> (PHILIPPI, 1844)	A,L5		

The species reported for the first time from the Eastern Mediterranean are the following ones:

GASTROPODA

Emarginula adriatica COSTA O.G., 1829

2 shells from station 20, at a depth of about 200 m, on clayey silt substrate. PIANI (1984) revised the genus *Emarginula* in the Mediterranean and gave the Ionian Sea as the eastern limit in the distribution of this species.

Discotectonica discus (PHILIPPI, 1844)

2 shells from station 12, at a depth of 130 m, on clayey silt substrate. This species is considered as a Mediterranean endemic, being widely distributed in this basin (e.g. MONTEROSATO, 1873; CARUS, 1893; D'ANGELO & GARGIULO, 1978; MELONE & TAVIANI, 1984).

Chrysallida jeffreysiana (MONTEROSATO, 1884 ex SEGUENZA G. ms.)

3 shells from station 42, at a depth of 160 m, on clayey silt substrate. According to CARUS (1893) this species was known in the Mediterranean Sea from Sicily (Palermo, Trapani) and Malta Island. If we accept AARTSEN'S (1977) opinion that *Chrysallida undata* (WATSON, 1897) is a synonym of *C. jeffreysiana* (MONTEROSATO, 1884 ex SEGUENZA G. ms.), then this species is also known from Ibiza (NORDSIECK, 1972). The presence of this species is also known from the Atlantic Ocean (NORDSIECK, 1972).

BIVALVIA

Limatula subovata (JEFFREYS, 1876)

3 specimens from station 19, at a depth of 50 m, on coralligenous substrate. Known from various areas of West and Central Mediterranean Sea (e.g. CARUS, 1893; NORDSIECK, 1971, 1974; PARENZAN, 1976). This species is widely distributed in the Atlantic Ocean and in the Arctic region (NORDSIECK, 1969; LUCAS, 1980).

Thyasira granulosa (MONTEROSATO, 1874 ex JEFFREYS ms.)

17 specimens from stations 3 (3 sp.), 6 (2 sp.), 8 (1 sp.), 12 (1 sp.), 14 (1 sp.), 17 (1 sp.), 18 (1 sp.), 41 (1 sp.), 44 (2 sp.), 47 (1 sp.), 57 (2 sp.) and 59 (1 sp.) at depths from 100 to 190 m on silt and clayey silt substrates. The distribution of this species in the Atlantic has been reported by NORDSIECK (1969) and DI GERONIMO & PANETTA (1973). In the Mediterranean Sea this species has been reported from Sicily (Palermo, Cape San Vito) and Naples (CARUS, 1893) as well as from Sardinia (DI GERONIMO & PANETTA, 1973) and the Gulf of Taranto (DI GERONIMO & PANETTA, 1973; VATOVA, 1973).

After a review of the relevant literature, 7 species (2 gastropods and 5 bivalves) are reported for the first time as components of the mollusc fauna of the Aegean Sea (Table III). The stations in which each of these species was found and the total number of live specimens and/or shells are given for each species. Data on these stations are reported in Table I.

Species	Stations	Specimens	
		live	shells
Gastropoda			
<i>Alvania paupercula</i>	36	-	6
<i>Raphitoma pseudohystrix</i>	19	-	4
Bivalvia			
<i>Musculus discors</i>	4,10,40	4	-
<i>Phaxas adriaticus</i>	5,8,11,13,16,19,43	10	-
<i>Sphenia binghami</i>	50	2	-
<i>Tellina compressa</i>	14,51,55	20	-
<i>Turtonia minuta</i>	51	2	-

Table III. Species new for the mollusc fauna of the Aegean Sea (for each species are given: number of specimens-live and/or shells - and stations of finding).

General consideration of gastropod and bivalve fauna of Crete island

Besides the 233 species found during this study along the coasts of Crete, 114 more species (78 gastropods, 36 bivalves) reported by other authors should be considered. With these 114 species the total number of the gastropods and bivalves known from the coasts of Crete reaches 347 species (222 gastropods, 125 bivalves). 97 species (64 gastropods, 33 bivalves) reported from Crete by the present study have already been recorded previously by other authors. The total gastropod and bivalve fauna of Crete, known up to now, is given in Table II, with the relevant literature sources, while its systematic composition is presented in Table IV. The classification used is that proposed by SABELLI et al. (1990).

The known gastropod and bivalve fauna of Crete, is composed of three main zoogeographical components: The Mediterranean endemic component, the Mediterranean-Atlantic component and the cosmopolitan component. The number of species and the percentages for each one of these components are given in Table V, from which it appears that the Mediterranean-Atlantic molluscs dominate the fauna.

Of particular interest is the complete lack of Indo-Pacific origin species (Lessepsian immigrants). In the area near Crete, a few Lessepsian immigrants have been reported so far: 7 species from Cyprus (MONTEROSATO, 1899; DEMETROPOULOS, 1971; DEMETROPOULOS & HADJICHRISTOPHOROU, 1976; TORNARITIS, 1987); 7 species from the south coasts of Turkey (MONTEROSATO, 1899; SWENNEN, 1961; GARAVELLI & MELONE, 1967; FALCHI, 1974; BLÖCHER, 1983); 2 species from the Aegean coasts of Turkey (DEMIR, 1977; MASSILIA, 1983); 5 species from the coasts of mainland Greece (GARAVELLI & MELONE, 1967; KALOPISSIS, 1981; NOFRONI, 1982; THOMPSON & CRAMPTON, 1984;

Class	Subclass	Order	Family	Genus	Species	
Gastropoda	Prosobranchia (172 sp., 77.40%)	Docoglossa	2	2	4 (1.80%)	
		Cocculiniformia	2	2	2 (0.90%)	
		Neritomorpha	1	1	1 (0.45%)	
		Vetigastropoda	8	17	34 (15.30%)	
		Neotaenioglossa	24	40	75 (33.76%)	
		Neogastropoda	7	42	56 (25.21%)	
	Heterobranchia (22sp., 10.00%)	Heterostropha	4	12	22 (10.00%)	
		Opisthobranchia (28sp., 12.60%)	Cephalaspidea	8	16	21 (9.44%)
			Thecosomata	3	4	5 (2.24%)
			Sacoglossa	1	1	1 (0.45%)
	Anaspidea	1	1	1 (0.45%)		
Total			61	138	222	
Bivalvia	Protobranchia (12sp., 9.60%)	Solemyoidea	1	1	1 (0.80%)	
		Nuculoidea	4	6	11 (8.80%)	
	Pteromorpha (35 sp., 28.00%)	Arcoidea	3	5	9 (7.20%)	
		Mytiloidea	2	8	9 (7.20%)	
		Pterioidea	4	12	17 (13.60%)	
	Heterodonta (66 sp., 52.80%)	Veneroidea	19	43	59 (47.20%)	
		Myoidea	4	6	7 (5.60%)	
	Anomalodesmata (12 sp., 9.60%)	Pholadomyoidea	6	8	12 (9.60%)	
Total			43	89	125	

Table IV. Systematic composition of gastropod and bivalve fauna of Crete.

ZOOGEOGRAPHICAL COMPONENTS	GASTROPODA	BIVALVIA	TOTAL
Mediterranean endemic	63 (28.38%)	10 (8.00%)	73 (21.04%)
Mediterranean - Atlantic	143 (64.41%)	103 (82.40%)	246 (70.89%)
Cosmopolitan	16 (7.21%)	12 (9.60%)	28 (8.07%)
total:	222	125	347

Table V. Geographical distribution of gastropod and bivalve fauna of the Crete Island (number and percentages of species are given for each component).

BARASH & DANIN, 1986); 3 species from Rhodes Island (MONTEROSATO, 1899; SETTEPASSI, 1968; NICOLAY, 1986), and 2 species from Karpathos Island (MONTEROSATO, 1899; NORDSIECK, 1973). From the above information it seems that the great majority of Lessepsian immigrants remains along the coasts boarding the Levant Sea. BARASH & DANIN (1977) and POR (1978) recorded 58 species of Lessepsian immigrants from this area. This number has been today raised to 81 species (AARTSEN & CARROZZA, 1983a; BARASH & DANIN, 1986; MIENIS & GAT, 1987a).

The mollusc fauna of the Mediterranean coasts of Israel is the best studied in the entire Eastern Mediterranean. A total of 685 species of gastropods and bivalves are known from this area (BARASH & DANIN, 1982; BARASH & DANIN, 1986; AARTSEN & CARROZZA, 1983a; GAT & FAIZILBER, 1983; MIENIS, 1983; MIENIS & GAT, 1987a, 1987b; JANSSEN, 1989, etc.).

The total number of gastropod and bivalve species known from the coasts of Cyprus is 375 (MONTEROSATO, 1899; DEMETROPOULOS, 1969, 1971; DEMETROPOULOS & HADJICHRISTOPHOROU, 1976; STAVRINOS, 1984; TORNARITIS, 1987; BARASH & DANIN, 1989) while 430 species are known from the North Aegean Sea (north of 38°), including the Sea of Marmara (FORBES, 1844; CARUS, 1893; STURANY, 1896; MARION, 1898; ATHANASSOPOULOS, 1917; PALLARY, 1917; BELLOC, 1948; SAKELLARIOU, 1957; JACQUOTTE, 1962; OBERLING, 1960-1962, 1969-1971; GELDIAY & KOCATAS, 1972; VERDUIN, 1976; KORONEOS, 1979; BOGDANOS & SATSMADJIS, 1983; DIAPOULIS & BOGDANOS, 1983; FRANKÓ, 1985; KOUKOURAS et al., 1985; THOMPSON, 1985; THOMPSON & JAKLIN, 1988; DIMITRAKIS, 1989; TENEKIDIS, 1989, etc.). About 550 gastropods and bivalves are known from the Adriatic (CARUS, 1893; COEN, 1914, 1937; ODHNER, 1914; VATOVA, 1949; RIEDL, 1963; SABELLI, 1969; MEL, 1969; ZAVODNIK, 1971; GAMULIN-BRIDA, 1974; VIO et al., 1979; THOMPSON, 1980; STJEPCEVIC et al., 1982; ZAVODNIK et al., 1985; THOMPSON & JAKLIN, 1988, etc.). Finally, from the N.E. Mediterranean coasts of Africa (coasts of Libya and Egypt) about 410 gastropods and bivalves are known (STURANY, 1896; PALLARY, 1912; MONTEROSATO, 1917; STEUER, 1939; AZOUZ, 1969; TIGANUS, 1984, etc.).

The total number of gastropod and bivalve species known from Crete is lower than that known from other areas and the difference ranges from 28 species (Cyprus) to 338 species (Mediterranean coasts of Israel). We believe that these differences are at least partly due to the lack of intensive research in most areas and especially along the coasts of Crete. As far as Crete is concerned, the above aspect is strengthened by the fact that this research mostly focussed on soft substrates and added a relatively large number of species (136) to those already known.

Taking into account all the above we think that the number of the gastropod and bivalve species known from Crete Island will increase significantly when future research will sufficiently cover all kinds of habitats, including those deeper than 250 m.

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